Paul Smith's College
Adirondack Watershed Institute

Technical Report

Limnology and Water Quality Program

# Chateaugay Lake Milfoil Monitoring Program: Project Update, Year 2016

Corey L. Laxson
*Paul Smith's College Adirondack Watershed Institute, claxson@paulsmiths.edu*

Daniel L. Kelting
*Paul Smith's College Adirondack Watershed Institute, dkelting@paulsmiths.edu*



## Recommended Citation

Laxson, C.L. and D.L. Kelting. 2016. Chateaugay Lake Milfoil Monitoring Program: Project Update, Year 2016. Report No: PSCAWI 2016-08,

## List of Tables



## List of Figures

## Summary

Eurasian water-milfoil (*Myriophyllum spicatum*) was first identified in the Chateaugay Lake Chain in 1979, marking it one of the earliest detections of milfoil in the Adirondack region. After decades of proliferation, lake users began to take notice of the non-native plant in the early 2000's. A series of aquatic plant surveys conducted by Cedar Eden Environmental and the Paul Smith's College Adirondack Watershed Institute illustrated a 5-fold increase in milfoil cover across the lake chain between 2002 and 2006 (AWI – unpublished data). Coordinated control efforts in the form of hand harvesting and benthic barrier matting began in 2008 and were focused solely on the area around the NYSDEC boat Launch. Control efforts expanded to the areas around the sandbar and the inlet to the lower lake in 2009, and the Chateaugay Narrows in 2010.

In an effort to monitor the success of the management strategy the Chateaugay Lake Foundation contracted the Paul Smith's College Adirondack Watershed Institute to established five underwater monitoring sites (Figure 1). At each site four permanent underwater transect lines (100 foot nylon ropes) were installed perpendicular to the shoreline, with the exception of the NYSDEC boat launch site which has three lines. Once in May and once in August a SCUBA diver swam each transect and recorded aquatic plant species presence as well as the number of milfoil stems in 6 feet wide by 10 feet long segments for the entire length of each transects line (Figure 2). This report serves as an update on the project for the year 2016. The objectives of this report are to summarize the 2016 data and analyze the historical milfoil abundance at the study sites. The proceeding information represents the primary findings of this report.

Chateaugay Lake Foundation

## Update of Results

**The Narrows**
*pg. 9-10*

We estimated average milfoil density at the Narrows to be 4,646 stems/acre in May, and 3,086 stems/acre in August. Although the milfoil density has fluctuated greatly, the stem density at this location is about 4-times lower than densities encountered in 2010. We encountered 14 aquatic plant species at the narrows, with Canada waterweed and eelgrass being the most frequently occurring species. Eurasian water milfoil was the sixth most frequent plant, occupying 50% of the study segments.

**South Inlet**
*pg. 11-12*

Milfoil management does not occur at this location at the South Inlet. Average milfoil density was estimated to be 508 stems/acre in May, and 1,180 stems/acre in August. milfoil density at the South Inlet transects experienced a natural decline during the winter of 2012 and have not rebounded. August abundance in 2009-2011 averaged 6,500 stems/acre with considerable variability between transects. We encountered 10 aquatic plant species at the south inlet, with Canada waterweed and stonewort being the most frequently occurring species. Eurasian water milfoil was the eighth most frequent plant, occupying 38% of the study segments.

**Inlet to Lower Lake**
*pg. 13-14*

Average milfoil density at the Lower Lake inlet was estimated at 5,028 stems/acre in May, and 9,347 stems/acre in August. From 2009 – 2011, August milfoil densities were in the 15,000 to 20,000stems/acre range. Over the past five years milfoil density at this location has been relatively stable. We encountered 10 aquatic plant species at the south inlet, with Canada waterweed and eelgrass being the most frequently occurring species. Eurasian water milfoil was the fifth most frequent plant, occupying 90% of the study segments.

**Sandbar**
*pg. 15-16*

The sandbar area has the greatest milfoil density of the five study sites. Average milfoil density at the sandbar was estimated at 10,436 stems/acre in May, and 13,431 stems/acre in August. Milfoil density was near 35,000 stems per acre during our first visit in May of 2009. Intensive harvesting effort resulted in a 50% reduction of stem density, particularly directly adjacent to the Sandbar. Since 2010 average milfoil density has fluctuated between 5,000 and 19,000 stems per acre. We encountered 16 aquatic

plant species at the south inlet, with Canada waterweed and water nymph being the most frequently occurring species. Eurasian water milfoil was the third most frequent plant, occupying 68% of the study segments.

**NYSDEC Boat Launch**
*pg. 17-18*

We estimated average milfoil density at the Boat Launch to be 581 stems/acre in May, and 1,718 stems/acre in August. Average August stem densities have ranged from 1,289 to 5,700 stems per acre between 2009 and 2016, substantially lower than the 38,000 stems per acre encountered in the summer of 2009. We encountered 11 aquatic plant species at the south inlet, with Canada waterweed and Eurasian water milfoil water nymph being the most frequently occurring species.

Table 1. Density of Eurasian water milfoil (stems/acre) at each of the study locations, 2008-2016. BTL = NYS Boat Launch, CLN = Chateaugay Lake Narrows, CSI = South Inlet, ILL = Inlet to Lower Lake, SBR = Sand Bar Area.

| | | | Eurasian water-milfoil (stems per acre) | | | | | |
|---|---|---|---|---|---|---|---|---|
| SITE | YEAR | Month | 1 | 2 | 3 | 4 | Average | SE |
| BTL | 2008 | JULY | 17351 | 98228 | 726 | | 38768 | 26080 |
| BTL | 2009 | MAY | 10019 | 74705 | 2759 | | 29161 | 19805 |
| BTL | 2009 | AUGUST | 3122 | 1815 | 3049 | | 2662 | 367 |
| BTL | 2010 | MAY | 3703 | 3485 | 4138 | | 3775 | 166 |
| BTL | 2010 | AUGUST | 2904 | 3412 | 3703 | | 3340 | 202 |
| BTL | 2011 | MAY | 0 | 799 | 944 | | 581 | 254 |
| BTL | 2011 | AUGUST | 944 | 2323 | 799 | | 1355 | 421 |
| BTL | 2012 | MAY | 581 | 1670 | 1815 | | 1355 | 337 |
| BTL | 2012 | AUGUST | 1960 | 5155 | 2468 | | 3194 | 858 |
| BTL | 2013 | MAY | 508 | 1379 | 2468 | | 1452 | 491 |
| BTL | 2013 | AUGUST | 1162 | | 10309 | | 5735 | 2156 |
| BTL | 2014 | MAY | 436 | 508 | 3703 | | 1549 | 933 |
| BTL | 2014 | AUGUST | 653 | 871 | 6897 | | 2807 | 1772 |
| BTL | 2015 | MAY | 1525 | 871 | 2251 | | 1549 | 399 |
| BTL | 2015 | AUGUST | 2105 | 1234 | 8422 | | 3920 | 2267 |
| BTL | 2016 | MAY | 0 | 0 | 1742 | | 581 | 581 |
| BTL | 2016 | AUGUST | 1016 | 0 | 4138 | | 1718 | 1525 |
| CLN | 2010 | MAY | 29040 | 2178 | 24103 | 15101 | 17606 | 3931 |
| CLN | 2010 | AUGUST | 36590 | 2323 | 5881 | 9148 | 13485 | 5218 |
| CLN | 2011 | MAY | 8785 | 1307 | 10091 | 4283 | 6117 | 1353 |
| CLN | 2011 | AUGUST | 24539 | 581 | 7478 | 2251 | 8712 | 3651 |
| CLN | 2012 | MAY | 7986 | 3122 | 5735 | 4283 | 5282 | 699 |
| CLN | 2012 | AUGUST | 1452 | 1016 | 12850 | 5300 | 5155 | 1827 |
| CLN | 2013 | MAY | 8204 | 1089 | 4283 | 5155 | 4683 | 976 |
| CLN | 2013 | AUGUST | 436 | 2033 | 10527 | 6389 | 4846 | 1137 |
| CLN | 2014 | MAY | 363 | 0 | 6171 | 5445 | 2995 | 1633 |
| CLN | 2014 | AUGUST | 508 | 2251 | 9220 | 25337 | 9329 | 5658 |
| CLN | 2015 | MAY | 581 | 145 | 3557 | 5445 | 2432 | 1258 |
| CLN | 2015 | AUGUST | 2468 | 1162 | 0 | 3122 | 1688 | 695 |
| CLN | 2016 | MAY | 1525 | 2105 | 7623 | 7333 | 4646 | 1640 |
| CLN | 2016 | AUGUST | 2323 | 1960 | 4792 | 3267 | 3086 | 632 |
| CSI | 2009 | AUGUST | 16480 | 5227 | 4719 | 0 | 6607 | 4937 |
| CSI | 2010 | MAY | 3267 | 3340 | 2178 | 0 | 2196 | 1107 |
| CSI | 2010 | AUGUST | 3630 | 10745 | 12052 | 0 | 6607 | 4792 |
| CSI | 2011 | MAY | 2614 | 1888 | 1089 | 0 | 1398 | 853 |
| CSI | 2011 | AUGUST | 4719 | 10527 | 11979 | 73 | 6824 | 1829 |
| CSI | 2012 | MAY | 145 | 436 | 73 | 0 | 163 | 64 |
| CSI | 2012 | AUGUST | 1162 | 1597 | 1815 | 0 | 1143 | 270 |
| CSI | 2013 | MAY | 363 | 290 | 145 | | 266 | 55 |
| CSI | 2013 | AUGUST | 726 | 871 | 726 | 73 | 599 | 28 |
| CSI | 2014 | MAY | 0 | 145 | 218 | 0 | 91 | 54 |
| CSI | 2014 | AUGUST | 0 | 1307 | 1162 | 0 | 617 | 358 |
| CSI | 2015 | MAY | 0 | 218 | 218 | 0 | 109 | 63 |
| CSI | 2015 | AUGUST | 0 | 1597 | 1234 | 0 | 708 | 415 |

| SITE | YEAR | Month | 1 | 2 | 3 | 4 | Average | SE |
|---|---|---|---|---|---|---|---|---|
| **CSI** | 2016 | MAY | 0 | 1162 | 71 | 0 | **508** | **299** |
| **CSI** | 2016 | AUGUST | 0 | 2251 | 2468 | 0 | **1180** | **683** |
| **ILL** | 2009 | MAY | 7550 | 5808 | 15827 | 18513 | **11925** | **2065** |
| **ILL** | 2009 | AUGUST | 31218 | 20110 | 11761 | 24539 | **21907** | **2720** |
| **ILL** | 2010 | MAY | 20546 | 14230 | 2105 | 41164 | **19511** | **5446** |
| **ILL** | 2010 | AUGUST | 14956 | 0 | 27878 | 22651 | **16371** | **4045** |
| **ILL** | 2011 | MAY | 11543 | 10164 | 1670 | 26354 | **12433** | **3419** |
| **ILL** | 2011 | AUGUST | 16117 | 20836 | 27806 | 21925 | **21671** | **1601** |
| **ILL** | 2012 | MAY | 2541 | 6824 | 2904 | 1234 | **3376** | **803** |
| **ILL** | 2012 | AUGUST | 10382 | 14593 | 9583 | 4792 | **9837** | **1339** |
| **ILL** | 2013 | MAY | 2686 | 6244 | 2178 | 1307 | **3104** | **723** |
| **ILL** | 2013 | AUGUST | 9728 | 12850 | 6897 | 6026 | **8875** | **771** |
| **ILL** | 2014 | MAY | 2105 | 3412 | 1162 | 1016 | **1924** | **552** |
| **ILL** | 2014 | AUGUST | 6970 | 10019 | 8131 | 10817 | **8984** | **876** |
| **ILL** | 2015 | MAY | 2323 | 3630 | 653 | 1815 | **2105** | **617** |
| **ILL** | 2015 | AUGUST | 7405 | 9075 | 4864 | 9946 | **7823** | **1118** |
| **ILL** | 2016 | MAY | 3485 | 6389 | 2468 | 7768 | **5028** | **1235** |
| **ILL** | 2016 | AUGUST | 8639 | 12342 | 5953 | 10454 | **9347** | **1361** |
| **SBR** | 2009 | MAY | 23885 | 54523 | 37171 | 31799 | **36845** | **4329** |
| **SBR** | 2009 | AUGUST | 10309 | 12995 | 6389 | 12052 | **10436** | **973** |
| **SBR** | 2010 | MAY | 13213 | 24466 | 3267 | 14375 | **13830** | **2889** |
| **SBR** | 2010 | AUGUST | 26935 | 12124 | 13358 | 11906 | **16081** | **2421** |
| **SBR** | 2011 | MAY | 3630 | 4211 | 1960 | 944 | **2686** | **501** |
| **SBR** | 2011 | AUGUST | 16045 | 6897 | 7841 | 12778 | **10890** | **1432** |
| **SBR** | 2012 | MAY | 22361 | 3557 | 7187 | 7333 | **10110** | **2784** |
| **SBR** | 2012 | AUGUST | 33396 | 11906 | 15464 | 16117 | **19221** | **3210** |
| **SBR** | 2013 | MAY | 21707 | 4937 | 8930 | 2831 | **9601** | **4229** |
| **SBR** | 2013 | AUGUST | 4211 | 14375 | 0 | 6244 | **6207** | **2463** |
| **SBR** | 2014 | MAY | 3122 | 2468 | 5082 | 3557 | **3557** | **555** |
| **SBR** | 2014 | AUGUST | 2468 | 5155 | 6026 | 7913 | **5391** | **1131** |
| **SBR** | 2015 | MAY | 2105 | 2033 | 2831 | 4937 | **2977** | **678** |
| **SBR** | 2015 | AUGUST | 3848 | 3775 | 3485 | 7260 | **4592** | **893** |
| **SBR** | 2016 | MAY | 32525 | 5518 | 2686 | 1016 | **10436** | **7421** |
| **SBR** | 2016 | AUGUST | 34703 | 10309 | 6752 | 1960 | **13431** | **7294** |

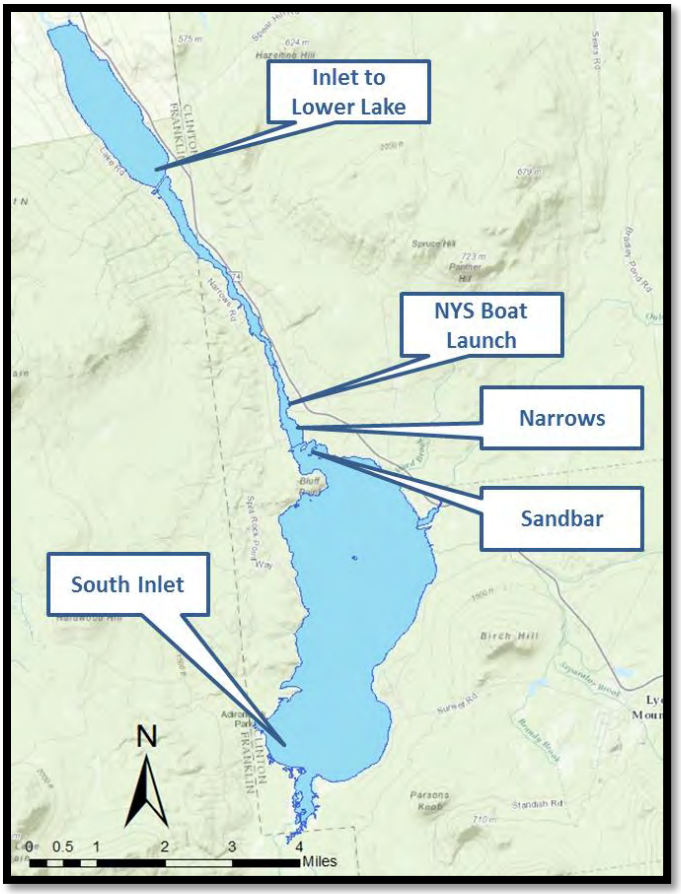


Figure 1. Study Locations on the Chateaugay Lakes, NY.

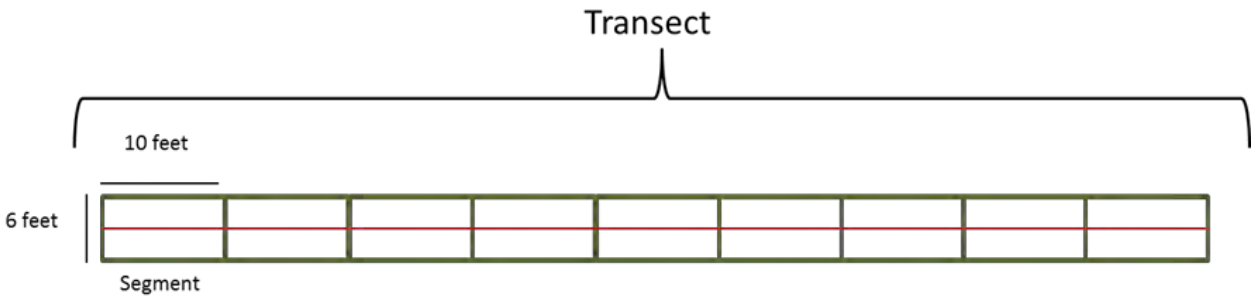


Figure 2. Detailed view of the underwater transects used in the study. The transects consist of a nylon rope that is anchored to the lake bottom between depths of 3 and 15 feet (red line). Each transect is divided into a number of 10' x 6' study segments. In each segment species occurrence is recorded and milfoil stems are enumerated.

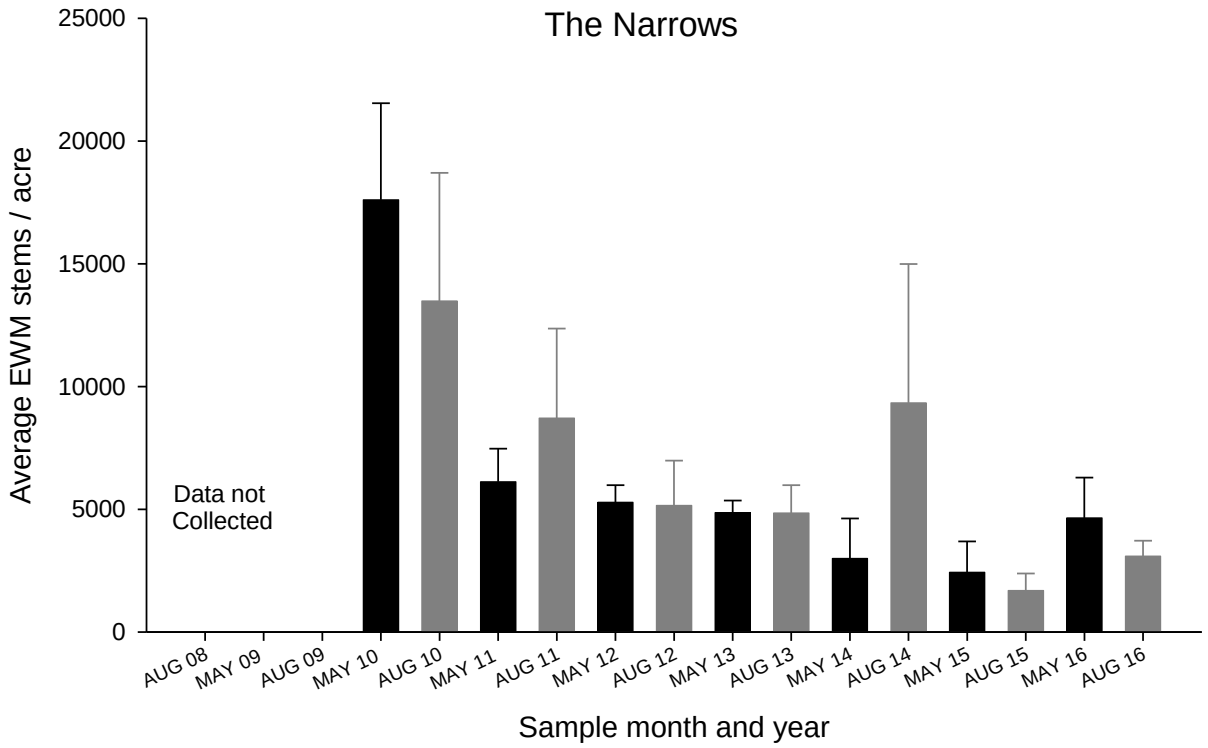


Figure 3 Average Eurasian water-milfoil density at the Narrows site during May (black bars) and August (grey bars), 2008-2016. Error bars represent standard error of the mean (n = 4 transects).

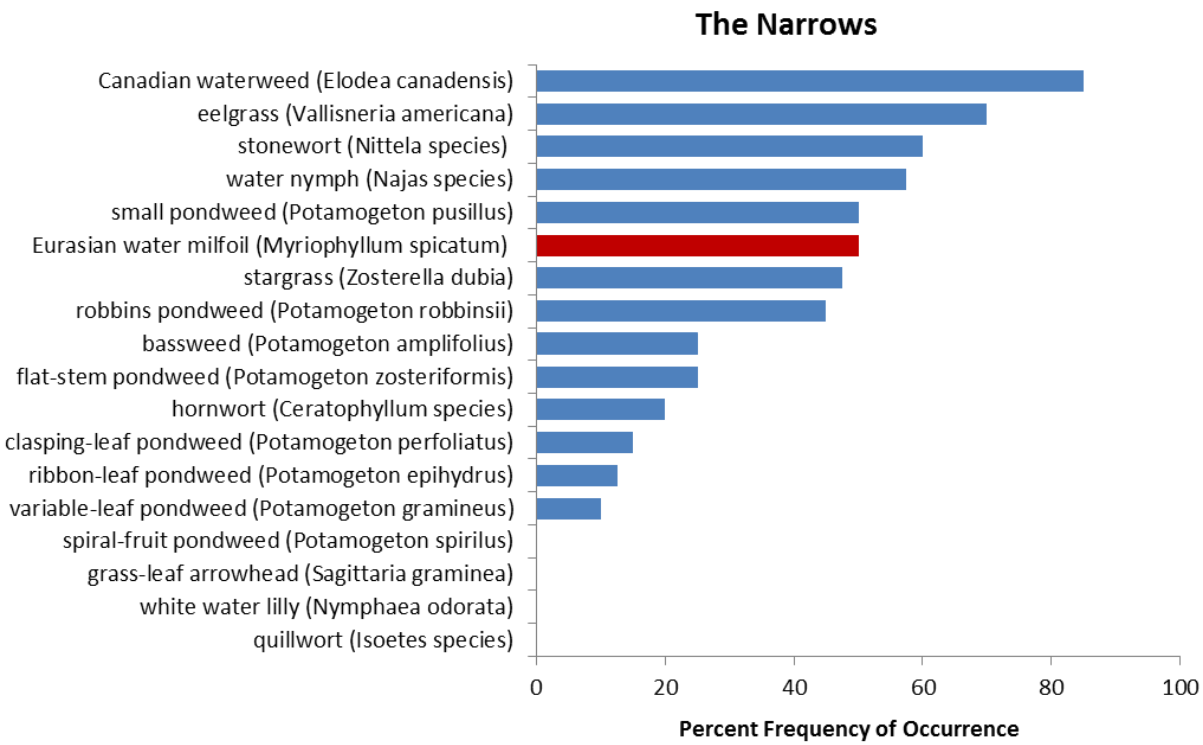


Figure 4. Percent frequency of occurrence of aquatic plant species on the study segments at the Chateaugay Lake Narrows, August 2016.

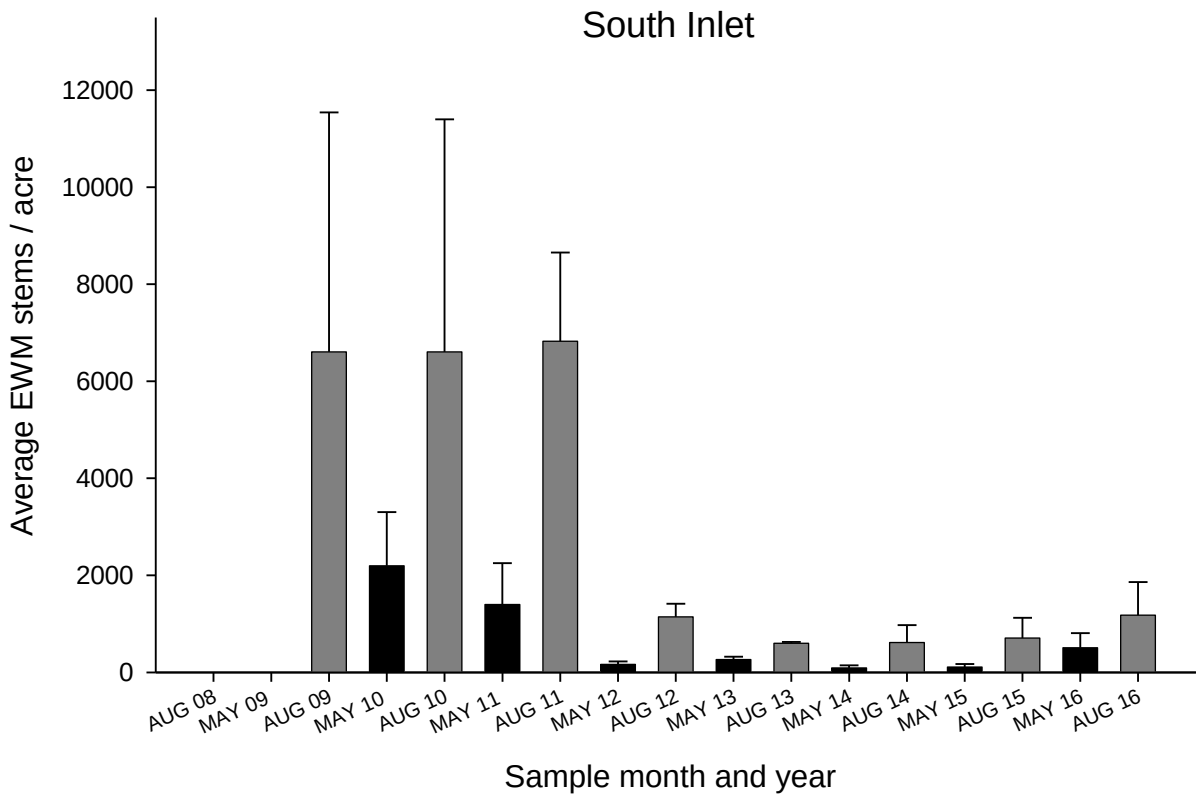


Figure 5. Average Eurasian water-milfoil density at the South Inlet site during May (black bars) and August (grey bars), 2008-2016. Error bars represent standard error of the mean (n = 4 transects).

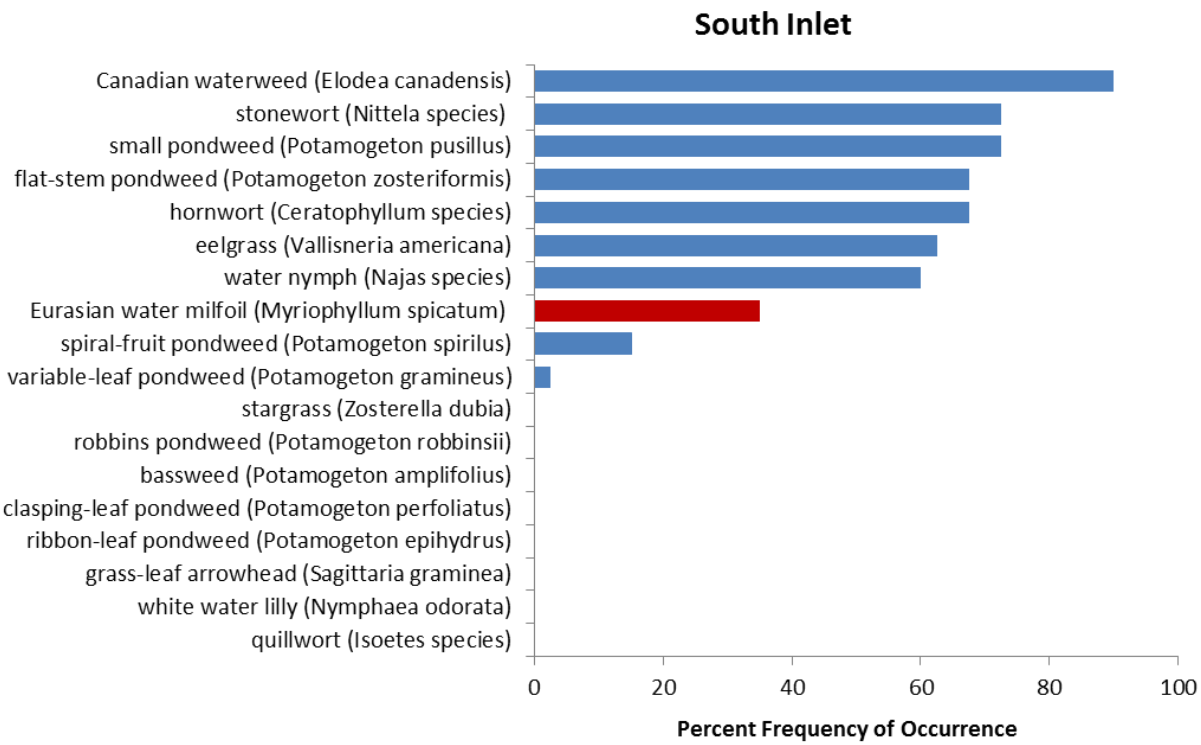


Figure 6. Percent frequency of occurrence of aquatic plant species on the study segments at the South Inlet, August 2016.

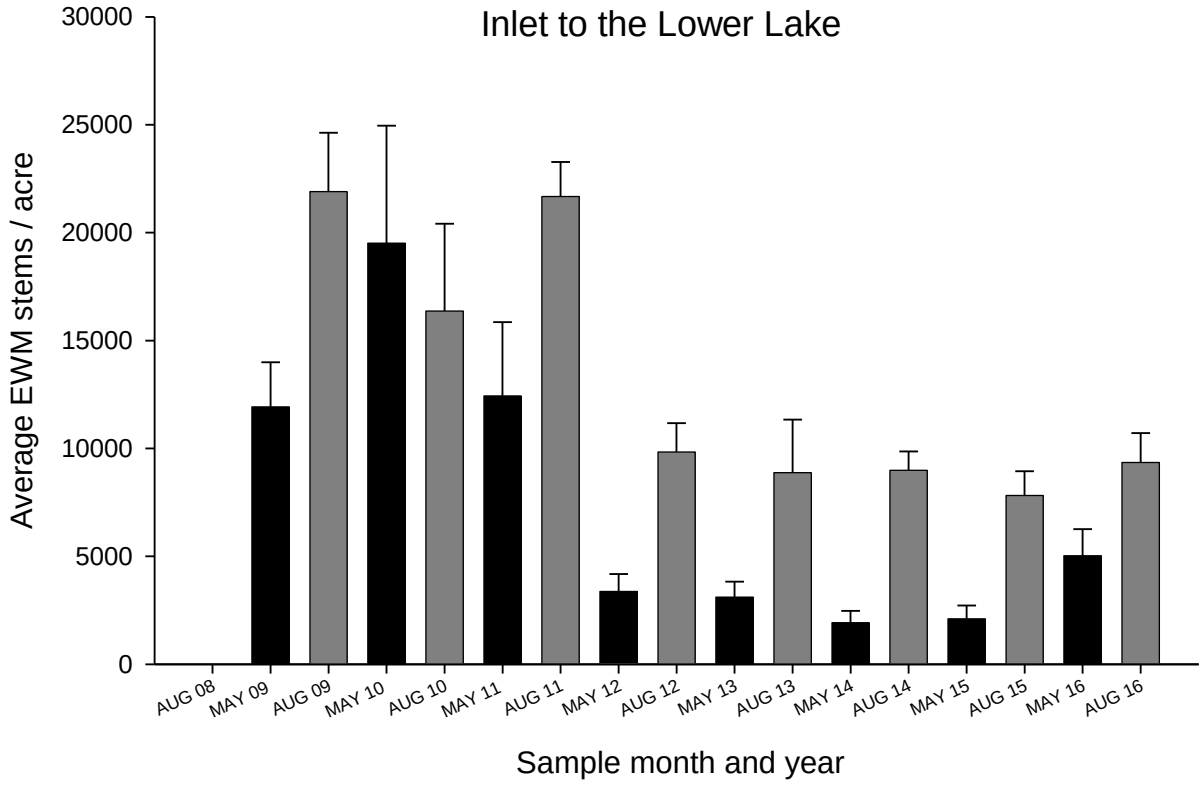


Figure 7. Average Eurasian water-milfoil density at the Lower Lake Inlet site during May (black bars) and August (grey bars), 2008-2016. Error bars represent standard error of the mean (n = 4 transects).

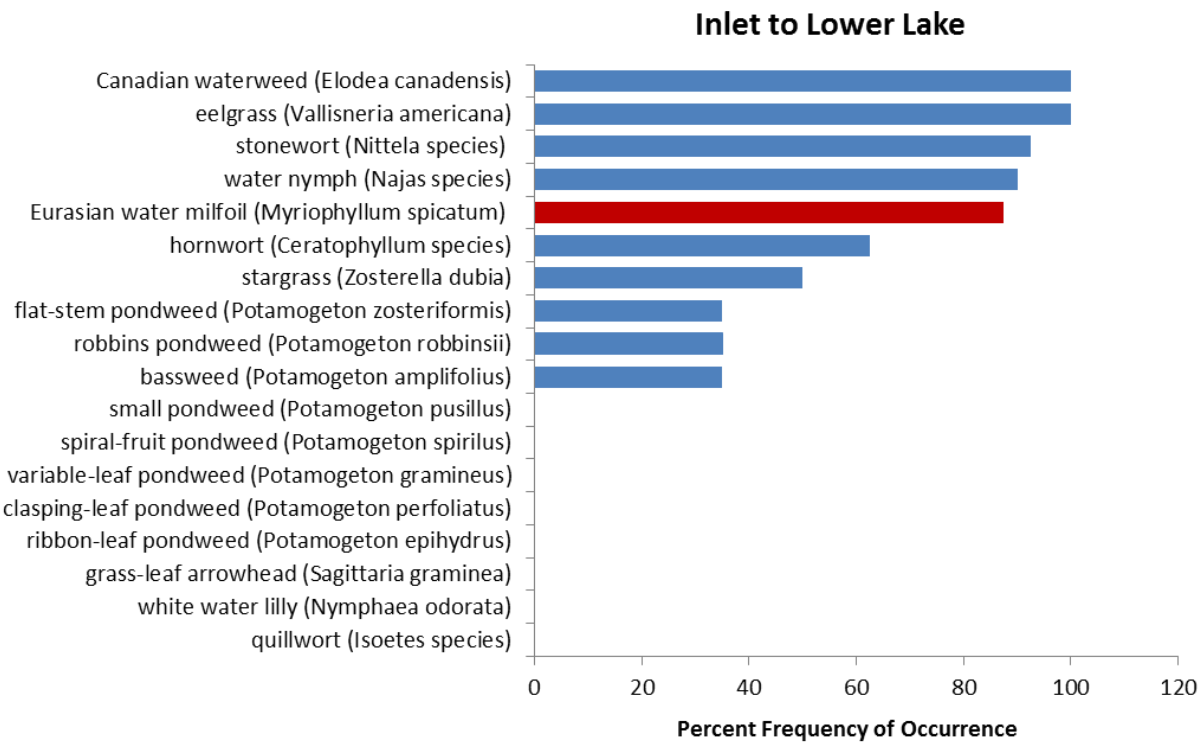


Figure 8. Percent frequency of occurrence of aquatic plant species on the study segments at the Lower Lake location, August 2016.

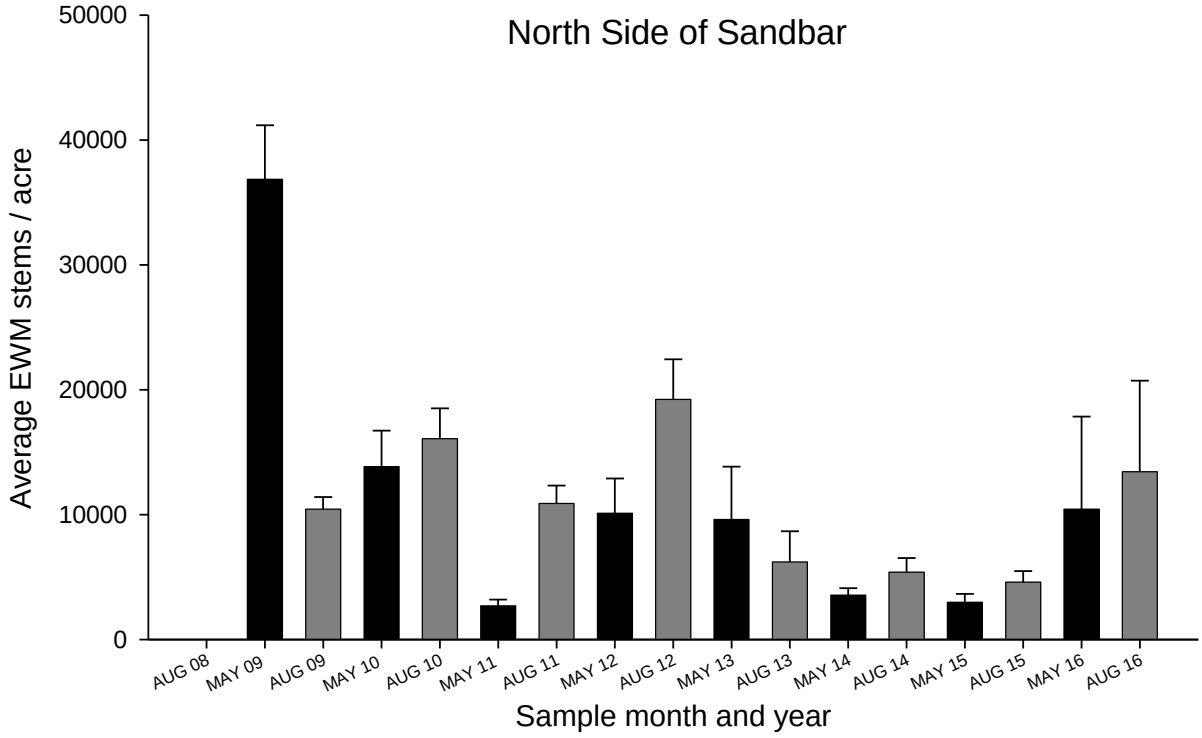


Figure 9. Average Eurasian water-milfoil density at the Sand Bar site during May (black bars) and August (grey bars), 2008-2016. Error bars represent standard error of the mean (n = 4 transects).

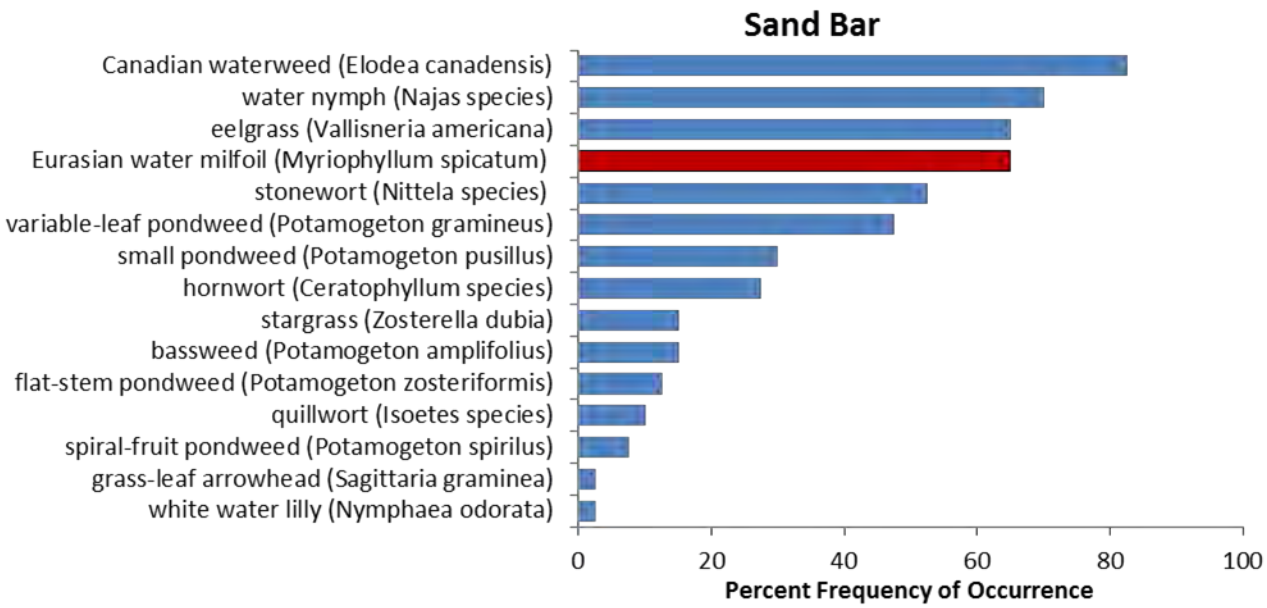


Figure 10. Percent frequency of occurrence of aquatic plant species on the study segments at the Sand Bar location, August 2015.

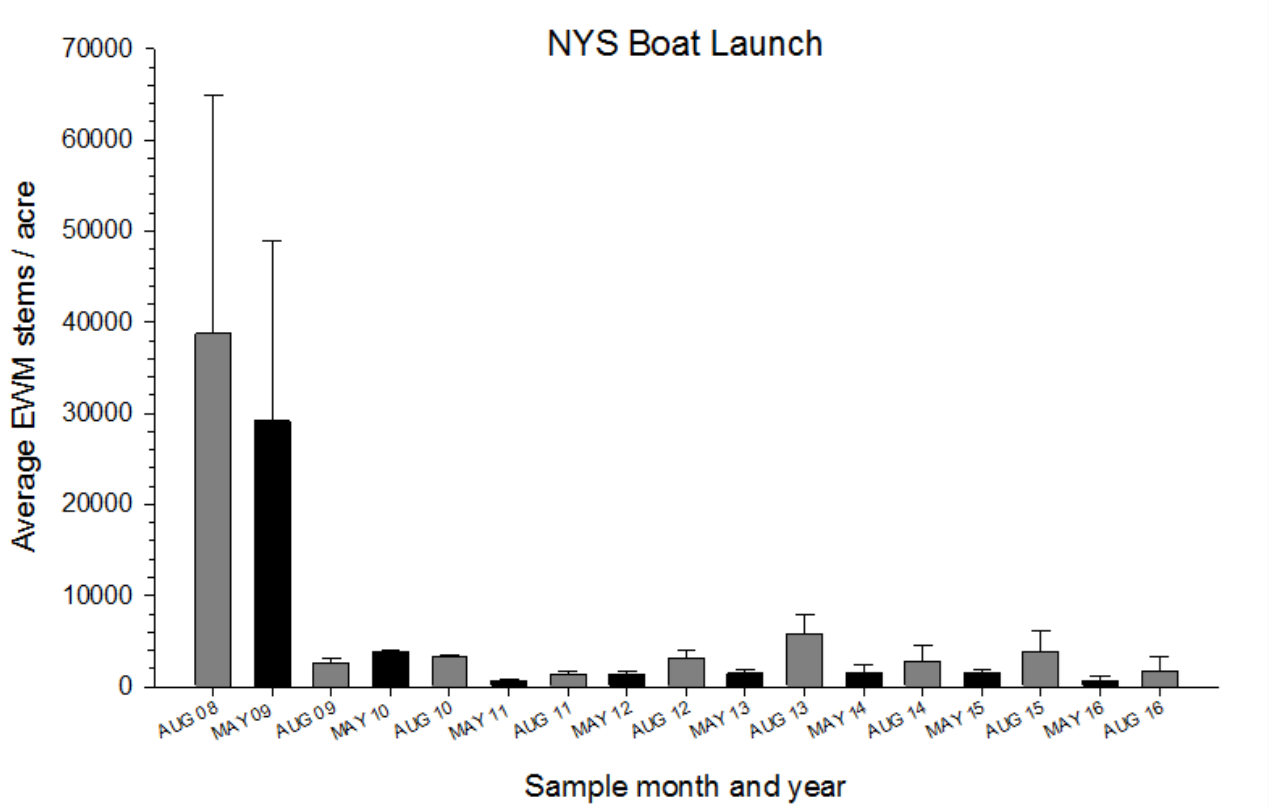


Figure 11. Average Eurasian water-milfoil density at the NYS Boat Launch during May (black bars) and August (grey bars), 2008-2016. Error bars represent standard error of the mean (n = 4 transects).

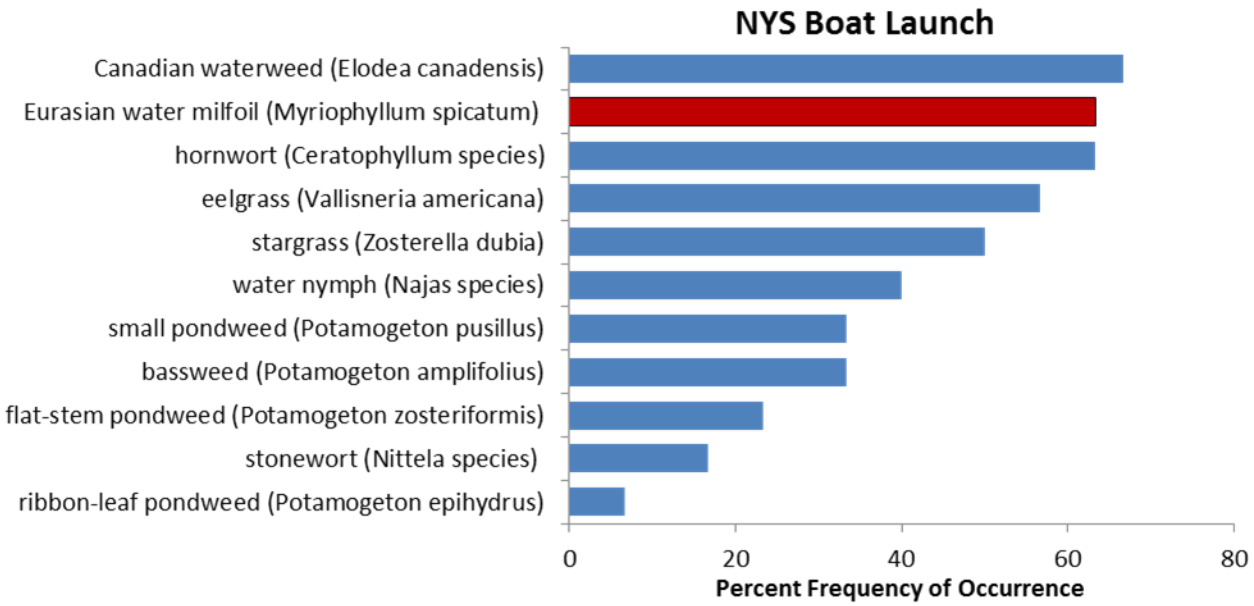


Figure 12. Percent frequency of occurrence of aquatic plant species on the study segments at the NYS Boat Launch location, August 2015.